

Zhuoran Li

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EDUCATION

National University of Singapore (NUS), Singapore

Bachelor of Science (Honors) in Data Science and Analytics

Aug. 2019 – Jun. 2024 (expected)

- **GPA:** 4.74/5.00 **Honors:** Highest Distinction (expected, upon graduation)
- **Highlight Courses:** CS4246: AI Planning and Decision Making (A+, graduate-level), CS4243: Computer Vision and Pattern Recognition (A+, graduate-level), CS4248: Natural Language Processing (A, graduate-level), CS4278: Intelligent Robots: Algorithms and Systems (A, graduate-level), ST4234: Bayesian Statistics (A), CS3244: Machine Learning (A+)

RESEARCH INTERESTS

My research lies at the intersection of **robotics**, **computer vision**, and **machine learning**. Specifically, I focus on **Embodied AI** and aim to develop novel intelligent systems that enable robots to better perceive, understand, and learn from multimodal information in their interactions with the physical world, and autonomously acquire the perception and manipulation skills necessary to execute complex tasks, ultimately achieving human-level performance in various scenarios, ranging from industrial applications to daily life assistance.

PUBLICATIONS

* indicates equal contribution

- [1] Hanxiao Jiang, Binghao Huang, Ruihai Wu, **Zhuoran Li**, Shubham Garg, Hooshang Nayyeri, Shenlong Wang, and Yunzhu Li
RoboEXP: Action-Conditioned Scene Graph via Interactive Exploration for Robotic Manipulation
arXiv, 2024 (Under Review)
[Project Page](#), [Paper](#), [Code](#), [Video](#)
- [2] Yixuan Wang*, **Zhuoran Li***, Mingtong Zhang, Katherine Driggs-Campbell, Jiajun Wu, Li Fei-Fei, Yunzhu Li
D³Fields: Dynamic 3D Descriptor Fields for Zero-Shot Generalizable Robotic Manipulation
arXiv, 2023 (Under Review)
Conference on Robot Learning (CoRL) Workshop on Towards Generalist Robots: Learning Paradigms for Scalable Skill Acquisition, 2023
Conference on Neural Information Processing Systems (NeurIPS) 6th Robot Learning Workshop: Pretraining, Fine-Tuning, and Generalization with Large Scale Models, 2023
Conference on Neural Information Processing Systems (NeurIPS) Workshop on Foundation Models for Decision Making, 2023
[Project Page](#), [Paper](#), [Code](#), [Video](#)

RESEARCH EXPERIENCES

Robotic Perception, Interaction, and Learning Lab (RoboPIL), University of Illinois Urbana-Champaign

Undergraduate Research Assistant, advised by Prof. Yunzhu Li

Oct. 2023 – Feb. 2024

- Designed a novel robotic exploration system, incorporating the Large Multimodal Model (LMM) and an explicit memory design, which incrementally constructs an action-conditioned scene graph that captures the underlying environment's structure through the robot's autonomous interactive exploration of the environment.
- Assisted with the deployment and evaluation of the system in embodied AI simulators like BEHAVIOR (OmniGibson) and SAPIEN, and assisted with the comprehensive visualization design of the system.

Stanford Vision and Learning Lab (SVL), Stanford University

Undergraduate Visiting Research Intern, advised by Prof. Jiajun Wu and Prof. Yunzhu Li

Apr. 2023 – Sep. 2023

- Designed an ideal scene representation for embodied AI by leveraging foundation models (e.g., DINOv2, Grounded-SAM, and XMem), which is a 3D, dynamic, and semantic representation that supports zero-shot generalizable robotic manipulation.
- Developed various meaningful household robotic manipulation tasks (e.g., organizing utensils, serving food, and organizing shoes) in an advanced simulator for embodied AI research, BEHAVIOR (OmniGibson).
- Evaluated the system extensively in both real-world and simulation experiments, where our representation was applied to a broad spectrum of household robotic manipulation tasks in a zero-shot manner and achieved impressive results.

Adaptive Computing Lab (AdaComp), National University of Singapore

Undergraduate Research Assistant, advised by Prof. David Hsu

Jan. 2021 – Aug. 2021

- Assisted with the design of a control and system architecture for autonomous long-horizon visual navigation on a Boston Dynamics Spot robot (i.e., an agile mobile robot).
- Conducted a large-scale navigation data collection for robot imitation learning, which included various kinds of scenarios in real-world navigation such as taking elevators, obstacles and pedestrians avoidance. Algorithms like DAGGER were applied during the collection process.
- Deployed MinIO on data servers for cloud data storage, and used Alluxio for data transfer between MinIO data servers and a local cluster of machines. Deployed the Determined AI framework on the cluster for fast containerized distributed model training.
- Assisted with real-world experiments to evaluate our visual navigation architecture.

TEACHING EXPERIENCES

CS3244: Machine Learning

Teaching Assistant, NUS

Aug. 2021 – Dec. 2021

- Conducted weekly tutorial sessions for a group of 25 NUS undergraduate students. Prepared slides and exercises for the students to learn and practice, where the teaching topics included generalized linear models, SVM, tree-based methods, EM, deep learning, etc.

CS2040: Data Structures and Algorithms

Teaching Assistant, NUS

Aug. 2020 – Dec. 2020

- Conducted weekly lab sessions for a group of 22 NUS undergraduate students. Prepared challenging coding questions for the students to practice. The topics covered basic data structures (e.g., linked lists, stacks, queues, hash tables, binary heaps, trees, and graphs), searching and sorting algorithms, and basic analysis of algorithms.

SELECTED HONORS & AWARDS

- **Certificate of Outstanding Performance & Top Students** in CS4243: Computer Vision and Pattern Recognition (graduate-level course), NUS
- **Certificate of Best Project Award** in CS4246: AI Planning and Decision Making (graduate-level course), NUS
- **Dean's List**, NUS
- **The Science & Technology Undergraduate Scholarship** (an undergraduate full scholarship offered to support outstanding students), NUS and Singapore Ministry of Education

SKILLS

Mathematics: Linear Algebra, Multivariable Calculus, Optimization, Probability Theory, Bayesian Statistics

Programming: Python, C/C++, Java, JavaScript, MATLAB

Softwares and Libraries: PyTorch, JAX, OpenCV, ROS, Blender

Simulators: BEHAVIOR (OmniGibson), SAPIEN, Nimble, Mujoco, Gymnasium, CARLA